

PROGRESS OF MEDICAL SCIENCE

MEDICINE

UNDER THE CHARGE OF

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Observations on the Circulation and Respiration in a Case of Paroxysmal Tachycardia.—BARCROFT, BOCK and ROUGHTON (*Heart*, 1921, 9, 7) determined the minute volume of the blood flow in a young man during attacks of paroxysmal tachycardia and during periods of normal cardiac mechanism. The subject was in apparent good health except for recurrent attacks of paroxysmal tachycardia, characterized by sudden onset and offset, shortness of breath, abnormal heart action, cyanosis, gastric disturbance, sweating and weakness. The method of determining the minute volume was that described by Barcroft and Roughton at the meeting of the Physiological Society in July, 1920 (*Jour. Physiol.*, 1920, 15), using the formula:

$$\text{Minute volume} = \frac{O}{A - V}$$

when O = total oxygen used by the subject per minute, A = oxygen content of the arterial blood, and V = oxygen content of the mixed venous blood. With a normal cardiac mechanism and a pulse-rate of 64 the minute volume was 5 liters and the output of the heart per beat, 77.5 cc. During an attack, with a pulse-rate of 198, the minute volume was 2.5 liters and the output of the heart per beat, 12.9 cc. During the attack, also, the oxygen consumption was reduced and the total ventilation, in spite of tachypnea, was diminished. The venous blood showed a high degree of unsaturation; the saturation of the arterial blood, on the other hand, was, if anything, increased.

Paroxysmal tachycardia, then, presents a clear case of anoxemia of the stagnant or ischemic type, which in this case is pushed so far as to cause a reduction in the quantity of oxygen used, i. e., "a crippling of the metabolism."

Studies on the Pneumonic Exudate. V. *The Relation of Pneumonic Lung Protease Activity to Hydrogen Ion Concentration, and a Consideration of the Origin of the Enzyme.*—NYE (*Jour. Exp. Med.*, 1922, **35**, 153), continuing the studies that he and LORD have been making on the pneumonic exudate (*Jour. Exp. Med.*, 1921, **34**, 199), points out the following facts: As early as 1877 it was demonstrated that leukocytes contain an enzyme or enzymes capable of splitting native proteins to simpler nitrogenous compounds. Opie, in 1906, working experimentally on sterile exudate, showed that there were two distinct proteolytic enzymes present, one derived from the polymorphonuclear leukocytes and acting best in slightly alkaline media, and one derived from mononuclear cells and acting best in slightly acid media. In the early articles it was shown that one enzyme in the pneumonic lung exudate acted best between pH 6.7 and 7.3, and another between 5.2 and 6.3, and the authors formulated the hypothesis that during the course of the disease in the pneumonic lung there is a gradual decrease in pH or increase in acidity. Primarily and at that time when the reaction of the exudate is about that of the circulating blood (pH 7.3 to 7.5) there is a digestion of the more highly organized proteins (fibrin, serum albumen, etc.) following the liberation of enzyme through cellular disintegration. With subsequent increase in acidity (beyond pH 6.7) the activity of this protease diminishes and conditions reach an optimum for the activity of the peptone-splitting enzyme. This peptonase or ereptase carries the splitting of the digestion products to amino-acids, absorbable as such; and resolution takes place. In this study Nye uses fibrin from the blood of horses and cellular suspensions from the consolidated lung. Since normal lung contains some enzyme it was necessary to rule out the action of this. The results show that there is present in the pneumonic lung an enzyme or enzymes capable of digesting horse fibrin which shows the maximum digestion (46 per cent of the fibrin) at pH 8 and the most complete digestion at pH 7. Normal lungs contain an enzyme which is active in a moderately acid medium, pH 4, and essentially inactive in less acid, neutral, and slightly alkaline medium. The possibility of the enzyme coming from pneumococci, cells normally present in lungs, or blood serum, is ruled out. He concludes that the enzyme is derived chiefly from the leukocytes, and is most active in a slightly alkaline medium (pH 8).

A Study of the Relation of the Adrenal Glands to Experimentally Produced Hypotension (Shock); with a Note on the Protective Effect of Preliminary Anesthesia.—RICH (*Bull. Johns Hopkins Hospital*, 1922, **33**, 79) found that the observations hitherto published regarding the relation of the adrenal glands to surgical shock were confusing and not infrequently contradictory to each other. The author carried out a series of nicely controlled experiments upon cats, some of which he subjected to adrenalectomy and subsequent intestinal manipulation; and others of which (ten in all) he subjected to identical operative

procedures and manipulation without previous adrenalectomy. Adrenalectomized animals fell into shock precisely as did the normal controls. It was also found that hypotension invariably followed removal of the adrenals before marked indications of asthenia supervened. The experiments prove conclusively that shock is not due to the elaboration of toxic material by the adrenals, since shock occurred equally well in the absence of these glands as in their presence. It seems, therefore, that the only tenable hypothesis by which the adrenals might be linked with shock would be to assume that the operative conditions were such as to completely overwhelm the organism and to render negligible any protective action which the adrenals might exert against shock. The author's conclusion that adrenal dysfunction is not a factor in the production of shock is a difficult one to escape. We should probably not, however, carry the dissociation of adrenals and shock too far. The author has stated that hypotension is one of the essential criteria of shock. He also concludes that the adrenals are a potent factor in the support of normal blood-pressure, since there is invariable hypotension following adrenalectomy. It seems, therefore, fair to conclude that, while adrenal dysfunction does not cause shock in the experiments carried out by the author, yet the fact that adrenal function supports blood-pressure is sufficient to place the adrenals upon the side of those factors that try, however ineffectually at times, to protect the organism from blood-pressure lowering agents.

A New Test of Hepatic Function.—HATIEGAN (*Bull. de l' Acad. de méd.*, 1922, 87, 170), with the aid of the duodenal tube, has studied the elimination of various coloring matters by the liver and regards the indigo-carmin of Voelker as a peculiarly suitable dye for the purpose inasmuch as its appearance is rapid and its elimination of short duration. If injected in doses of 0.16 gm. its excretion is appreciable in about twenty minutes by a grass-green color of bile; this color becomes accentuated and attains its maximum two or three hours after its injection, when its intensity begins to diminish, until after five or six hours it reaches about the same shade which it had attained in the first forty or sixty minutes. In the normal liver, elimination begins after twenty minutes and reaches its maximum in two or three hours. In portal cirrhosis without icterus, 0.16 gm. is not always followed by an appreciable elimination. If the dose, however, is not under 0.24 gm. its elimination may always be made out, but the onset and the rhythm of the elimination are interfered with. In the first hour the bile is unaltered. After an hour the discoloration begins, reaching its maximum in from three to four hours. In five cases of portal cirrhosis without jaundice examined by the writer—cases which resembled one another clinically—the course of the elimination was essentially the same and indicated a delay explicable perhaps by the retardation of the hepatic circulation. The excretion, however, was of the same intensity as normally, but the period of elimination was delayed. A similar delay was observed in a case of cardiac failure. The writer concludes that "indigo-carmin" is eliminated by the normal liver and even by the diseased liver if there be no jaundice. This proceeding may be utilized for the examination of the excretory functions of the liver cell and the permeability of the

bile passages if the cellular excretory function be normal—a circumstance which authorized us in suggesting the employment of this procedure for the examination of hepatic affections in general. The dose necessary for an elimination is 0.16 gm.; to attain the reaction with certainty one must employ a dose of 0.24 gm.

Observations Relating to the Action of Quinidine Upon the Dog's Heart; with Special Reference to its Action on Clinical Fibrillation of the Auricles.—LEWIS, DRURY, ILIESCU and WEDD, (*Heart*, 1921, 9, 21), working upon dogs, were able to confirm previous work showing that quinidine causes (1) lowering of the rate of the sinoauricular rhythm; (2) slowing of the auricular-ventricular conduction; (3) slowing of the intraventricular conduction as shown by the increase in the length of the Q. R. S. group. They point out for the first time that conduction in the auricular muscle is also profoundly slowed. In an attempt to analyze the "lowered excitability" which has been noted by many workers, Lewis observed that quinidine in the doses used lengthens the absolute refractory period. Finally, a parietic action on the vagi has been observed. In the light of these known actions of quinidine, the effects of quinidine sulphate upon clinical fibrillation of the auricle are explained, if the last is regarded as fundamentally due to circus movement. "A sufficient lengthening of the refractory period, by reducing the responsive gap, will either bring the circus movement to an end or it will slow the circuit movements. A reduced rate of conduction will slow the circuit movements, but will tend to establish the circus movement more firmly. If the refractory period factor predominates, the circus movement will end; if the conduction factor predominates, the circus movement will not end, but will become slower. An increased rate of ventricular beating under quinidine, in auricular fibrillation, is ascribed to the lowered rate of auricular beating in part, and paresis of the vagi in part."

Hyperpermeability of the Liver in Diabetes.—HATIEGAN (*Bull. de l'Acad. de méd.*, 1922, 87, 236) pursuing his studies on the elimination of indigo-carmin by the liver, has observed, in a case of diabetes, a remarkably abundant elimination of this substance, so great indeed that with 0.24 gm. the duodenal content was of a blue color identical with that of the injected solution. The foam even of the duodenal juice was of an intense bluish color, a phenomenon which he had never observed previously. In six cases of diabetes mellitus 0.08 gm. of indigo-carmin—a dose so small that its elimination is not appreciable in the normal liver—was excreted in such quantities as easily to be demonstrable. In one of these cases 0.04 gm. indigo-carmin was excreted in quantities easily recognizable—the elimination following the normal course and rhythm. The writer believes that these observations prove that in diabetes the liver has undergone profound alterations which result in a hyperpermeability in regard to coloring matters. He believes that the hyperpermeability as well as the hyperabuminosis of the bile suggests that the liver has undergone grave functional alterations and has become a simple "filter." He regards these observations as supporting Glénard's well-known contention that alterations in the liver play a serious role in diabetes. His

cases were apparently all instances of severe diabetes; he refers to them as *diabète consomptif*. Two instances of mild diabetes showed no change. The writer believes that the indigo-carmin test may be of some value as a means of diagnosis between milder and severer forms of diabetes.

SURGERY

UNDER THE CHARGE OF

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The Results of Ninety-eight Cases of Nerve Suture.—DARE (*British Med. Jour.*, June 18, 1921, p. 885) says that all his cases are the result of gunshot wounds and have been under observation from twelve to thirty-six months. The author has taken the amount of motor recovery as the standard because it is more important functionally and was more easily determined. Sensory recovery, however, was more complete and earlier than return of motor power. Good or satisfactory results were obtained in 51 per cent of the cases, while 49 per cent were bad results. The series included ulnar, median, musculospiral, sciatic, musculocutaneous and brachial plexus lesions. The only cases to receive any preoperative or postoperative treatment by means of splints were a few of the musculospiral cases. The author feels that 51 per cent greatly exceeds the real truth, especially if one regards recovery from the point of functional usefulness. The results, on the whole, then are in some measure disappointing, considering the tremendous amount of regenerative power that the axis cylinders possess—probably more than any other tissue in the body. The neglect of splints has been responsible for most of the failures, especially with regard to the delicate intrinsic muscles of the hand. Electrical methods have not impressed the author and in the future he will not employ them for it is impossible to know exactly what one is doing in many cases. Moreover, Scheft showed, in 1851 (Langley confirmed his results in 1916), that a denervated muscle is in a state of fibrillation. The keynote of treatment is rest with gradual reëducation to muscles that have been injured by denervation from whatever cause. The recovery of sensation is practically never perfect, but in a great many cases some recovery of sensation returns and this of itself is a great advantage to the individual, protecting him from burns and other injuries and also indirectly leading to an increase of nutritional activity.

The Treatment of Syphilis by Intravenous Injections of Mercury.—LANE (*Lancet*, October 15, 1921, p. 796) says that this treatment was more rapid in its effect than any other method of mercurial adminis-